

AMENDMENT

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Filing Date: September 30, 2003

Title: PERFORMANCE INDEX FOR ABSORBENT ARTICLES HAVING IMPROVED LEAKAGE PERFORMANCE

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This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): An absorbent article comprising a top sheet, a back sheet, and an absorbent core disposed between the top sheet and the back sheet, the absorbent core having a total basis weight within the range of from about 20 g/m² to about 150 g/m², whereby the absorbent article has a 3 variable urine only leakage performance index (PI_{3UL}) of less than about 3.0, the PI_{3UL} being determined in accordance with the following equation (1):

$$PI_{3UL} = 0.046(Tc) - 2.94(MS100) - 0.772(AUL) \quad (1)$$

where Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution absorbed per gram of pad material, the AUL having a value of about 23 grams of fluid/gram of material or more.

Claim 2 (original): The absorbent article of claim 1, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is less than about 2.9.

Claim 3 (original): The absorbent article of claim 1, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is less than about 2.7.

Claim 4 (original): The absorbent article of claim 1, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is within the range of from about 0.5 to about 2.9.

Claim 5 (original): The absorbent article of claim 1, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is within the range of from about 0.75 to about 2.7.

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Claim 6 (original): The absorbent article of claim 1, wherein the absorbent article is a Stage 4 diaper.

Claim 7 (currently amended): An absorbent article comprising a top sheet, a back sheet, and an absorbent core disposed between the top sheet and the back sheet, the absorbent core having a total basis weight within the range of from about 20 g/m² to about 150 g/m², whereby the absorbent article has a five variable urine only leakage Performance Index (PI_{SUL}) of less than about negative 6.4, whereby PI_{SUL} is determined in accordance with the following equation (2):

$$PI_{SUL} = 0.006(Tc) - 7.094(Se) + 1.108(MS100) - 0.18(AUL) + 0.023(St) \quad (2)$$

where Se is surrounds efficiency, St is the third void strikethrough, Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution absorbed per gram of pad material, the AUL having a value of about 23 grams of fluid/gram of material or more.

Claim 8 (original): The absorbent article of claim 7, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is less than about negative 6.5.

Claim 9 (original): The absorbent article of claim 7, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is less than about negative 6.75.

Claim 10 (original): The absorbent article of claim 7, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is within the range of from about negative 9.3 to about negative 6.4.

Claim 11 (original): The absorbent article of claim 7, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is within the range of from about negative 8.75 to about negative 6.75.

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Claim 12 (original): The absorbent article of claim 7, wherein the absorbent article is a Stage 4 diaper.

Claim 13 (currently amended): An absorbent article comprising a top sheet, a back sheet, and an absorbent core disposed between the top sheet and the back sheet, the absorbent core having a total basis weight within the range of from about 20 g/m² to about 150 g/m², whereby the absorbent article has a 3 variable overall leakage performance index (PI_{3OL}) of less than about negative 2.65, whereby the PI_{3OL} is determined in accordance with the following equation (3):

$$PI_{3OL} = 0.062(Tc) - 17.54(MS100) - 1.107(AUL) \quad (3)$$

where Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution, the AUL having a value of about 23 grams of fluid/gram of material or more.

Claim 14 (original): The absorbent article of claim 13, wherein the 3 variable overall leakage performance index (PI_{3OL}) is less than about negative 2.75.

Claim 15 (original): The absorbent article of claim 13, wherein the 3 variable overall leakage performance index (PI_{3OL}) is less than about negative 2.9.

Claim 16 (original): The absorbent article of claim 13, wherein the 3 variable overall leakage performance index (PI_{3OL}) is within the range of from about negative 7.0 to about negative 2.65.

Claim 17 (original): The absorbent article of claim 13, wherein the 3 variable overall leakage performance index (PI_{3OL}) is within the range of from about negative 6.3 to about negative 2.9.

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Claim 18 (original): The absorbent article of claim 13, wherein the absorbent article is a Stage 4 diaper.

Claim 19 (currently amended): An absorbent article comprising a top sheet, a back sheet, and an absorbent core disposed between the top sheet and the back sheet, the absorbent core having a total basis weight within the range of from about 20 g/m² to about 150 g/m², whereby the absorbent article has a five variable overall leakage Performance Index (PI_{5OL}) of less than about negative 9.3, whereby PI_{5OL} is determined in accordance with the following equation (4):

$$PI_{5OL} = 0.018(Tc) - 3.75(Se) - 11.35(MS100) - 0.465(AUL) + 0.033(St) \quad (4)$$

where Se is surrounds efficiency, St is the third void strikethrough, Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution, the AUL having a value of about 23 grams of fluid/gram of material or more.

Claim 20 (original): The absorbent article of claim 19, wherein the five variable overall leakage Performance Index (PI_{5OL}) is less than about negative 9.45.

Claim 21 (original): The absorbent article of claim 19, wherein the five variable overall leakage Performance Index (PI_{5OL}) is less than about negative 9.75.

Claim 22 (original): The absorbent article of claim 19, wherein the five variable overall leakage Performance Index (PI_{5OL}) is within the range of from about negative 13.0 to about negative 9.3.

Claim 23 (original): The absorbent article of claim 19, wherein the five variable overall leakage Performance Index (PI_{5OL}) is within the range of from about negative 12.35 to about negative 9.75.

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Claim 24 (original): The absorbent article of claim 19, wherein the absorbent article is a Stage 4 diaper.

Claim 25 (currently amended): A method of designing an absorbent article to have reduced urine only leakage comprising modifying one or more absorbent article variables by carrying out one or more procedures selected from the group consisting of: (i) adjusting the front pad absorbency under load (AUL) to a value of about 23 grams of fluid/gram of material or more; (ii) adjusting the percent utilization of the absorbent core (MS100) to a value of about 43% or more; (iii) adjusting the surrounds efficiency (Se) to a value of about 90% or more; (iv) adjusting the third void strikethrough (St) to a value of less than about 30 seconds; and (v) maintaining the total capacity of the absorbent article (Tc) to a value of less than about 495 grams and greater than about 465 grams.

Claim 26 (original): The method of claim 25, wherein the front pad absorbency under load (AUL) is adjusted to a value greater than 23.5.

Claim 27 (original): The method of claim 26, wherein the front pad absorbency under load (AUL) is adjusted to a value greater than 24.

Claim 28 (original): The method of claim 25, wherein the percent utilization (MS100) of the absorbent core is adjusted to greater than about 43.5%.

Claim 29 (original): The method of claim 28, wherein the percent utilization (MS100) of the absorbent core is adjusted to greater than about 44.5%.

Claim 30 (original): The method of claim 25, wherein the total capacity Tc is maintained at a value within the range of from about 465 grams to about 490 grams.

Claim 31 (currently amended): The method of claim 25, wherein the total capacity Tc is maintained at a value within the range of from about 465 grams to about 485 grams.

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Claim 32 (original): The method of claim 25, wherein the third void strikethrough (St) of the absorbent article is adjusted to be less than about 28 seconds.

Claim 33 (original): The method of claim 32, wherein the third void strikethrough (St) of the absorbent article is adjusted to be less than about 27 seconds.

Claim 34 (original): The method of claim 25, wherein the surrounds efficiency (Se) is adjusted to be greater than about 93%.

Claim 35 (original): The method of claim 34, wherein the surrounds efficiency (Se) is adjusted to be greater than about 94%.

Claim 36 (original): The method of claim 25, wherein at least two of the procedures are carried out.

Claim 37 (original): The method of claim 25, wherein all of the procedures are carried out.

Claim 38 (original): A method of designing an absorbent article to have reduced overall leakage comprising modifying one or more absorbent article variables by carrying out one or more procedures selected from the group consisting of: (i) adjusting the front pad absorbency under load (AUL) to a value of about 23 grams of fluid/gram of material or more; (ii) adjusting the percent utilization of the absorbent core (MS100) to a value of about 43% or more; (iii) adjusting the surrounds efficiency (Se) to a value of about 89% or more; (iv) adjusting the third void strikethrough (St) to a value of less than about 38 seconds; and (v) maintaining the total capacity of the absorbent article (Tc) to a value of less than about 495 grams and more than about 465 grams.

Claim 39 (original): The method of claim 38, wherein the front pad absorbency under load (AUL) is adjusted to a value greater than 23.5.

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Claim 40 (original): The method of claim 39, wherein the front pad absorbency under load (AUL) is adjusted to a value greater than 24.

Claim 41 (original): The method of claim 38, wherein the percent utilization (MS100) of the absorbent core is adjusted to greater than about 43.5%.

Claim 42 (original): The method of claim 41, wherein the percent utilization (MS100) of the absorbent core is adjusted to greater than about 44.5%.

Claim 43 (original): The method of claim 38, wherein the total capacity Tc is maintained at a value within the range of from about 465 grams to about 490 grams.

Claim 44 (currently amended): The method of claim 38, wherein the total capacity Tc is maintained at a value within the range of from about 465 to about 485 grams.

Claim 45 (original): The method of claim 38, wherein the third void strikethrough (St) of the absorbent article is adjusted to be less than about 35 seconds.

Claim 46 (original): The method of claim 45, wherein the third void strikethrough (St) of the absorbent article is adjusted to be less than about 28 seconds.

Claim 47 (original): The method of claim 38, wherein the surrounds efficiency (Se) is adjusted to be greater than about 93%.

Claim 48 (original): The method of claim 47, wherein the surrounds efficiency (Se) is adjusted to be greater than about 94%.

Claim 49 (original): The method of claim 38, wherein at least two of the procedures are carried out.

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Claim 50 (original): The method of claim 38, wherein all of the procedures are carried out.

Claim 51 (previously amended): A method of making the absorbent article of claim 1 comprising providing a top sheet, a back sheet, and an absorbent core to a garment forming station; and disposing the absorbent core between the top sheet and the back sheet at the garment forming station to form the absorbent article.

Claim 52 (original): The method of claim 51, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is less than about 2.9.

Claim 53 (original): The method of claim 51, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is less than about 2.7.

Claim 54 (original): The absorbent article of claim 51, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is within the range of from about 0.5 to about 2.9.

Claim 55 (original): The absorbent article of claim 51, wherein the 3 variable urine only leakage performance index (PI_{3UL}) is within the range of from about 0.75 to about 2.7.

Claim 56 (original): The absorbent article of claim 51, wherein the absorbent article is a Stage 4 diaper.

Claim 57 (original): A method of making the absorbent article of claim 7 comprising
providing a top sheet, a back sheet, and an absorbent core to a garment forming station;
and
disposing the absorbent core at least partially between the top sheet and the back sheet at the garment forming station to form the absorbent article.

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Claim 58 (original): The method of claim 57, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is less than about negative 6.5.

Claim 59 (original): The method of claim 57, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is less than about negative 6.75.

Claim 60 (original): The method of claim 57, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is within the range of from about negative 9.3 to about negative 6.4.

Claim 61 (original): The method of claim 57, wherein the five variable urine only leakage Performance Index (PI_{SUL}) is within the range of from about negative 8.75 to about negative 6.75.

Claim 62 (original): The method of claim 7, wherein the absorbent article is a Stage 4 diaper.

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Claim 63 (currently amended): A method of determining the three variable urine only leakage performance index of an absorbent article comprising:

measuring at least the total capacity, the front pad AUL and the percent utilization of the absorbent article;

optionally measuring the surrounds efficiency and the third void strikethrough of the absorbent article; and

calculating the three variable urine only leakage performance index of the article by carrying out the following calculation (1):

$$PI_{3UL} = 0.046(Tc) - 2.94(MS100) - 0.772(AUL) \quad (1)$$

where Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution absorbed per gram of pad material, the AUL having a value of about 23 grams of fluid/gram of material or more.

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Claim 64 (currently amended): A method of determining the five variable urine only leakage Performance Index comprising:

measuring at least the total capacity, the front pad AUL, the percent utilization, the surrounds efficiency, and the third void strikethrough of the absorbent article; and

calculating the five variable urine only leakage performance index of the article by carrying out the following calculation (2):

$$PI_{SUL} = 0.006(Tc) - 7.094(Se) + 1.108(MS100) - 0.18(AUL) + 0.023(St) \quad (2)$$

where Se is surrounds efficiency, St is the third void strikethrough, Tc is the total capacity of the article in grams, MS100 is the percent utilization of the absorbent core upon insult with 100 ml of 0.9 wt % saline solution, and AUL is the front pad absorbency under load of the absorbent article, expressed in grams of 0.9 wt % saline solution absorbed per gram of pad material, the AUL having a value of about 23 grams of fluid/gram of material or more.

Claim 65 (previously amended): A method of designing an absorbent article having reduced leakage comprising:

measuring a plurality of variables on a plurality of different absorbent articles;

determining through use testing the percentage of the plurality of absorbent articles that have urine only leakage, and that have overall leakage;

determining through regression analysis which of the plurality of variables for the plurality of absorbent articles provides a substantially direct correlation with the urine only leakage percentage and/or overall leakage percentage to produce at least two leakage variables that substantially directly correlate with leakage percentage; and

determining through regression analysis a direct correlation between a combination of the at least two leakage variables and urine only leakage and/or overall leakage to provide a multi-variable performance index; and adjusting the multi-variable performance index to reduce the leakage percentage of the absorbent article.